Space Weather Forecast

Issued on Sunday 12 January 2025 at 01:15 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of isolated Moderate class flares. Chance of G1-G2/Minor-Moderate Geomagnetic Storms this weekend Day 1-2 (12-13 Jan).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low solar activity during the last 24 hours with only Common-class flares observed. There are now nine sunspot regions on the visible disc. A region in the northwest remains the largest and most magnetically complex group. This region has been responsible for the majority of flare activity over the past few days and maintains a complicated magnetic structure, however, many of its interior spots have tended to decay in recent hours. A smaller sunspot group to the northwest of this group saw some slight decay of its constituent spots. Meanwhile a region in the northeast remains a simple, mature region, but has had some development of its intermediate spots in recent hours. The remaining regions on the disc remain small and simple with limited overall change.

A lack of recent SOHO coronagraph imagery, combined with large gaps in STEREO coronagraph imagery has meant that the detection of Coronal Mass Ejections (CMEs) has been more challenging than usual. However, SOHO imagery has recently returned and does not indicate any Earth-directed CMEs during the period.

Solar Wind / Geomagnetic Activity: Solar winds have been slightly elevated throughout the period, varying between 400-480km/s. The Interplanetary Magnetic Field was largely weak, aside from a brief moderate period during the afternoon. The north-south component, was weak and variable. Geomagnetic activity was Quiet to Unsettled (Kp1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate, with a chance of further Moderate flares and a very slight chance of isolated Strong flares, mainly due to the moderately large sunspot region located in the northwest disc or any spots that rotate over the eastern limb later in the period.

Solar Wind / Geomagnetic Activity: A recent lack of coronagraph imagery means that CME analysis has been extremely difficult and comes with significant uncertainty for the forecast period. A possible Earth-directed CME from near the centre disc on 09 Jan may bring some

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enhanced geomagnetic activity, most likely over Day 1 or Day 2 (12-13 Jan), but is very low confidence in terms of a possible arrival and timings. Solar winds are currently slightly elevated due to the ongoing fast wind from a coronal hole. This is expected to decline by the end of Day 2 (13 Dec) with speeds returning to normal background levels. Fast winds from another coronal hole is expected to bring some minor enhancement from Day 3 (14 Jan).

Geomagnetic activity is expected to be mainly Quiet to Unsettled between Days 1 and 2 (12-13 Jan), but with a chance of G1 to G2 Minor/Moderate Storms on Days 1 and 2 should any CME influence be forthcoming (very low confidence). On Day 3 (14 Jan) activity is expected to increase to Unsettled to Active levels, following the onset of the HSS from CH08/-, with a chance of peak G1/Minor Storm conditions.

Energetic Particles / Solar Radiation: Solar radiation is expected to remain at background levels, with only a slight chance of rising in response to any notable flares.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	20	20	15
Strong	G3	No	5	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	No	30	30	40	40
Very Active	R3-R5 (X Class)	No	5	5	5	5

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	15	15	15	15
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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